Citation:

Baylin A, Kabagambe EK, Ascherio A, Spiegelman D, Campos H. Adipose tissue a-linolenic acid and nonfatal acute myocardial infarction in Costa Rica. *Circulation.* 2003 Apr; 107(12): 1,586-1,591.

PubMed ID: 12668490

Study Design:

Case control.

Class:

C - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the association between adipose tissue a-linolenic acid and nonfatal acute myocardial infarction (MI).

Inclusion Criteria:

Survivors of a first acute MI at three Costa Rican hospitals from 1994 to 1998.

Exclusion Criteria:

Death during hospitalization, more than 75 years of age on day of first MI, physically or mentally unable to answer questionnaire, had previous hospital admission related to cardiovascular disease (CVD).

Description of Study Protocol:

26±10 days after MI (31±15 days for controls):

- Interview questionnaire of medical history
- Sociodemographics
- Smoking
- Socioeconomic status
- FFQ,
- Subcutaneous adipose tissue biopsy.

Data Collection Summary:

Adipose tissue fatty acids assessed by gas-liquid chromatography.

Description of Actual Data Sample:

482 case patients with first nonfatal acute MI, 482 matched controls (age, sex, area of residence).

Summary of Results:

Compared with controls, cases were more likely to be current smokers and had lower adipose tissue a-linolenic acid levels (P<0.001).

An inverse relationship was observed between adipose tissue a-linolenic acid and the risk of nonfatal acute MI. Subjects in the top quintiles of adipose tissue a-linolenic acid (0.72% of fatty acids) had a lower risk of MI than those in the lowest quintile (0.35% of fatty acids): OR (95% CI), 1.00; 0.80 (0.52 to 1.24); 0.53 (0.34 to 0.82); 0.44 (0.28 to 0.67); and 0.37 (0.24 to 0.59); test for trend, P<0.0001. This association was strengthened after adjustment for established MI risk factors, including smoking, physical activity, income and adipose tissue linoleic acid and trans fatty acids (OR for the top versus the lowest quintile, 0.23; 95% CI: 0.10 to 0.50, test for trend, P<0.0001). Further adjustment for the intake of saturated fat, fiber, alcohol and vitamin E did not change this association (OR for the top versus the lowest quintile, 0.23, 95% CI, 0.10 to 0.55, test for trend, P<0.0001).

The greatest protection is observed among those with high a-linolenic acid and low trans fatty acids, and the interaction between these two variables was significant (P<0.05).

Author Conclusion:

We found that a-linolenic acid is associated with a large and significant reduction in the risk of nonfatal acute MI. The greatest protection was found among those with high a-linolenic acid and low total trans fatty acids in adipose tissue. Adipose tissue a-linolenic acid was two-fold higher in the highest than in the lowest quintile, and the difference of 0.38% corresponds to approximately 0.3g per day of intake. In summary, we found that a-linolenic acid is protective against MI in a population with a low fish intake. We can conclude that diets rich in a-linolenic acid may be beneficial in the prevention of nonfatal acute MI, and this benefit is even larger among populations with low levels of trans fatty acids.

Reviewer Comments:

Author notes that the main advantage of the study is the use of biomarkers as indicators of intake, but that they are prone to lab errors and may not reflect intake accurately due to differences in absorption and metabolism. However, tissue concentrations may be more relevant to disease than dietary intakes.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	???
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	No
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	???
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	???
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	???

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	Yes
6.6.	Were extra or unplanned treatments described?	Yes
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	???
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	???
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	???
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	No
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	???
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes